By Express Mail # EV072606320US

FORM PTO-1390 (REV 10-94) U S DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

DOCKET #: 3397-113PUS

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

U.S. APPLICATION NO. (If known, see 37 CFR 1.5)

10/088459

INTERNATIONAL APPLICATION NO	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/FI00/00809	21 September 2000	24 September 1999

TITLE OF INVENTION

Calender

APPLICANT(S) FOR DO/EO/US

Mika VILJANMAA

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. [x] This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. [] This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371
3. [x] This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. [x] A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. [x] A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. [x] is transmitted herewith (required only if not transmitted by the International Bureau).
   b. [x] has been transmitted by the International Bureau.
   c. [] is not required, as the application was filed in the United States Receiving Office (RO/US)
6. [] A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. [x] Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. [x] are transmitted herewith (required only if not transmitted by the International Bureau). (**See Reply to Written Opinion**)
   b. [] have been transmitted by the International Bureau.
   c. [] have not been made; however, the time limit for making such amendments has NOT expired.
   d. [] have not been made and will not be made.
8. [] A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. [x] An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. [] A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. Below concern other document(s) or information included:

11. [x] An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. [x] An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. [x] A **FIRST** preliminary amendment.
    [] A **SECOND** or **SUBSEQUENT** preliminary amendment.
14. [] A substitute specification.
15. [] A change of power of attorney and/or address letter.
16. [x] Other items or information *(specify)*: PCT Publication Sheet, Int'l Preliminary Examination Report, Reply to Written Opinion, PCT Request, PCT Demand, Notification of the Recording of a Change

U.S. APPLICATION NO (if known, see 37 CFR 1.5)	INTERNATIONAL APPLICATION NO	ATTORNEY'S DOCKET NUMBER
10/088459	PCT/FI00/00809	3397-113PUS

17.[x]The following fees are submitted:

Basic National Fee (37 CFR 1.492(a)(1)-(5)):
Search Report has been prepared by the EPO or JPO **$890.00**
International preliminary examination fee paid to USPTO (37 CFR 1.482)..... **$710.00**
No international preliminary examination fee paid to USPTO (37 CFR 1.482)
but international search fee paid to USPTO (37 CFR 1.445(a)(2))..... **$740.00**
Neither international preliminary examination fee (37 CFR 1.482)
nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO **$1040.00**
International preliminary examination fee paid to USPTO (37 CFR 1.482)
and all claims satisfied provisions of PCT Article 33(2)-(4) **$100.00**

			ENTER APPROPRIATE BASIC FEE AMOUNT =	$	890
Surcharge of **$130.00** for furnishing the oath or declaration later than [] 20 [] 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				$	
Claims	Number Filed	Number Extra	Rate		
Total Claims	24 - 20 =	4	x **$18.00**	$	72
Independent Claims	2 - 3 =		x **$84.00**	$	
Multiple dependent claim(s) (if applicable)			+ **$280.00**	$	
			TOTAL OF ABOVE CALCULATIONS =	$	962
Reduction of ½ for filing by small entity, if applicable.				$	
			SUBTOTAL =	$	962
Processing fee of **$130.00** for furnishing the English translation later than [] 20 [] 30 months from the earliest claimed priority date (37 CFR 1.492(f)).			+	$	
			TOTAL NATIONAL FEE =	$	962
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by the appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property			+	$	40
			TOTAL FEES ENCLOSED		$1002
			Amount to be refunded:		$
			charged:		$

a. [x] Two checks in the amounts of $ 40 and $ 962 to cover the above fees are enclosed.
b. [] Please charge my Deposit Account No. 03-2412 in the amount of $____ to cover the above fees. A duplicate copy of this sheet is enclosed.
c. [x] The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 03-2412. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:
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By Express Mail # EV072606320US · March 15, 2002

Attorney Docket # 3397-113PUS

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re National Phase PCT Application of
Mika VILJANMAA
International Appln. No.: PCT/FI00/00809
International Filing Date: 21 September 2000
For: Calender

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231
BOX PCT

S I R:

Prior to examination of the above-identified application, amend the application as follows:

IN THE SPECIFICATION:

Page 1, delete lines 3 to 5, the paragraph beginning with "The present invention", and insert therefor the following title and paragraph:

--**FIELD OF THE INVENTION**

The present invention relates to a calender for calendering a web of paper or board.--.

Page 1, before line 6, the paragraph beginning with "Conventionally,", insert the following title:

--**BACKGROUND OF THE INVENTION**--.

Page 3, before line 10, the paragraph beginning with "It is an object", insert the following title:

--**SUMMARY OF THE INVENTION**--.

Page 4, delete the two paragraphs from line 15 to line 21, and insert therefor the following paragraph and title:

-- Other objects and features of the present invention will become apparent from the following detailed description considered in conjunction with the accompanying drawings. It is to be understood, however, that the drawings are intended solely for purposes of illustration and not as a definition of the limits of the invention, for which reference should be made to the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS--.

Page 4, before line 32, the paragraph beginning with "Referring to FIG. 1,", insert the following title:

--**DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENTS**--.

Page 7, after the last line, insert the following paragraph:

--Thus, while there have been shown and described and pointed out fundamental novel features of the present invention as applied to a preferred embodiment thereof, it will be understood that various omissions and substitutions and changes in the form and details of the devices described and illustrated, and in their operation, and of the methods described may be made by those skilled in the art without departing from the spirit of the present invention. For example, it is expressly intended that all combinations of those elements and/or method steps which perform substantially the same function in substantially the same way to achieve the same results are within the scope of the invention. Substitutions of elements from one described embodiment to another are also fully intended and contemplated. It is also to be understood that the drawings are not necessarily drawn

to scale but that they are merely conceptual in nature. It is the intention, therefore, to be limited only as indicated by the scope of the claims appended hereto.---.

IN THE CLAIMS:

Cancel claims 1 to 9, without prejudice.

Add the following new claims:

10. A calender for calendering a web of paper or board comprising

a top variable-crown roll;

a bottom variable-crown roll;

at least one intermediate roll positioned between said top roll and said bottom roll, said top roll, said bottom roll and said at least one intermediate roll being disposed in a stack such that the rolls may be brought into nip contact with adjacent rolls to form a nip during calendering;

bearing blocks in which said rolls are mounted;

a frame;

mounts to which said bearing blocks of said at least one intermediate roll are connected, said mounts of said at least one intermediate roll being slidably connected to guides in said frame; and

actuator means positioned between at least one of said mounts and said bearing blocks, said actuator means operable to relieve nip loading imposed by weight of said rolls and auxiliary means, the auxiliary means comprising said bearing blocks, said mounts and said actuator means.

11. The calender of claim 10, wherein said actuator means comprises a spring.

12. The calender of claim 10, wherein said actuator means comprises a hydraulic cylinder.

13. The calender of claim 11, wherein said actuator means comprises a hydraulic cylinder.

14. The calender of claim 10, wherein said actuator means are adapted to function between said mounts of said rolls forming said nips.

15. The calender of claim 11, wherein said actuator means are adapted to function between said mounts of said rolls forming said nips.

16. The calender of claim 12, wherein said actuator means are adapted to function between said mounts of said rolls forming said nips.

17. The calender of claim 13, wherein said actuator means are adapted to function between said mounts of said rolls forming said nips.

18. The calender of claim 10, wherein said actuator means are adapted to function between said bearing blocks of said rolls forming said nips.

19. The calender of claim 11, wherein said actuator means are adapted to function between said bearing blocks of said rolls forming said nips.

20. The calender of claim 12, wherein said actuator means are adapted to function between said bearing blocks of said rolls forming said nips.

21. The calender of claim 13, wherein said actuator means are adapted to function between said bearing blocks of said rolls forming said nips.

22. The calender of claim 14, wherein said actuator means are adapted to function between said bearing blocks of said rolls forming said nips.

23. The calender of claim 15, wherein said actuator means are adapted to function between said bearing blocks of said rolls forming said nips.

24. The calender of claim 16, wherein said actuator means are adapted to function between said bearing blocks of said rolls forming said nips.

25. The calender of claim 17, wherein said actuator means are adapted to function between said bearing blocks of said rolls forming said nips.

26. The calender of claim 12, wherein a cylinder portion of said hydraulic cylinders and hydraulic channels thereof are formed in said mounts.

27. The calender of claim 13, wherein a cylinder portion of said hydraulic cylinders and hydraulic channels thereof are formed in said mounts.

28. The calender of claim 12, wherein a cylinder portion of said hydraulic cylinders and hydraulic channels thereof are formed in said bearing blocks.

29. The calender of claim 13, wherein a cylinder portion of said hydraulic cylinders and hydraulic channels thereof are formed in said bearing blocks.

30. The calender of claim 26, wherein a cylinder portion of said hydraulic cylinders and hydraulic channels thereof are formed in said bearing blocks.

31. The calender of claim 27, wherein a cylinder portion of said hydraulic cylinders and hydraulic channels thereof are formed in said bearing blocks.

32. A method for calendering a web of paper or board comprising:

passing a web to be calendered via nips formed by a top variable-crown roll, a bottom variable-crown roll, and at least one intermediate roll, at least one intermediate roll being positioned between said top roll and said bottom roll, said top roll, said bottom roll and said at least one intermediate roll being disposed in a stack such that the rolls may be brought into nip contact with adjacent rolls to form a nip during calendering, said rolls being mounted in bearing blocks, the bearing blocks of the intermediate roll being slidably connected to a frame by mounts; and

relieving nip loading imposed by weight of said rolls and auxiliary means with an actuator means positioned between at least one of said mounts and said bearing blocks, the auxiliary means comprising the bearing blocks, the mounts and the actuator means.

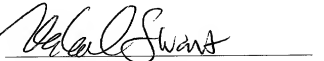
33. The method of claim 32, wherein the actuator means are operable to accomplish at least substantially complete relief of the nip loading imposed by the weight of said intermediate rolls and the auxiliary means connected thereto.

REMARKS

This preliminary amendment is presented to place the application in proper form for examination and to eliminate multiple dependency from the present claims. No new matter has been added. Early examination and favorable consideration of the above-identified application is earnestly solicited.

Any additional fees or charges required at this time in connection with the application may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,
COHEN, PONTANI, LIEBERMAN & PAVANE

By: 

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15 March 2002

Calender

The present invention relates to a calender according to the preamble of claim 1 and a calendering method according to the preamble of claim 8.

Conventionally, the surface of a moving web of paper or board is smoothed and made glossy in a multiroll calender comprising a plurality of rolls stacked in a calender frame so as to form a nip contact with each other. The roll stack comprises a top roll and a bottom roll with at least one intermediate roll located therebetween. The rolls of the stack are compressed against each other by the top and bottom rolls that act as the loading rolls or, simply, by the bottom roll to provide a sufficiently high linear nip force. In calendering, the web passes through the calender nips formed by the superimposed rolls.

The rolls of the calender stack are mounted rotatably in bearing blocks that are usually attached to roll mounts. The roll mounts themselves are slidably connected to vertical guides adapted to the calender frame. In a conventional supercalender, the roll mounts are additionally connected to vertical screw jack assemblies adapted to the calender frame. When the roll stack is open, the positioning of the roll mounts in the vertical direction is accomplished by means of the jack assemblies comprising threaded screw rods and nuts running thereon. As each one of the mounts of the roll bearings rest on these jack nuts, the entire weight of the set of rolls is supported on the screw rods when the roll stack is

unloaded. Bearing blocks of roll stack and thereby the rolls mounted thereon can be moved vertically in regard to the mounts.

The roll set of a multiroll calender has a plurality of rolls in a superimposed disposition, whereby the linear load imposed on the nips by the weights of the rolls increases nip-by-nip from the top nip to bottom nip, whereby the linear load in the bottom nip is the maximum stress imposed by the calender on the web passing the calender. Hence, the calender must be designed based on the load-bearing ability of the bottom nip, whereby a substantial portion of the potential calendering capacity of the upper nips remains unused. Also the weights of the roll bearing blocks and auxiliary devices connected thereto cause distortion in the linear pressure profiles of the nips, particularly at the nip ends, thus deteriorating the quality of the calendered web.

One technique developed for equalizing the nip loading is the so-called variable-crown calender, wherein the weights of the intermediate rolls do not essentially contribute to the linear load in the nips. In calenders equipped with variable-crown roll, the intermediate rolls of the stack are provided with load-relieving devices such as hydraulic load-relief cylinders or pivotal links connected to the calender frame, by means of which arrangements the linear load imposed by the intermediate rolls and auxiliary devices connected thereto can be relieved, thus allowing the nips to be loaded mainly by the variable-crown top and bottom rolls or, alternatively, an external load imposed on said rolls. In a load-relief

system for the intermediate rolls, the design factors to be taken into account are the deflection stiffness, mass, shape and material properties of each roll. The support forces to be imposed on the intermediate rolls are varied with the help of the load-relief means so that the roll set is equilibrated and brought to a desired state of crowning. Variable-crown calenders are described, among other things, in US Pat. No. 5,438,920.

It is an object of the present invention to provide an entirely novel type of calender construction capable of relieving the linear loads imposed on the calender nips by the weights of the roll masses.

The goal of the invention is achieved by way of disposing actuator means such as springs or hydraulic cylinders between the mounts of each superimposed pair of rolls so as to relieve the linear load of the nips. Within the constraints of available space, the actuator means may also be placed between the bearing blocks of two superimposed rolls forming a nip. If so needed, the cylinder portion of the hydraulic cylinder and the hydraulic fluid channels may be machined into the interior of the bearing blocks or their mounts.

The invention offers significant benefits.

In a calender according to the invention, the linear load of the nips may be relieved, whereby the loading imposed by the upper nips on the web can be increased, thus achieving a higher calendering capacity and improved quality of web calendering. A calender implemented ac-

cording to the invention has a simple construction. For instance, it needs no threaded screws and nuts conventionally used in the position adjustment jacks of rolls inasmuch the rolls are separated from each other with the help of actuator means so that the rolls are displaced apart from each other by the distance of the quick-opening gap when the roll stack is unloaded. As the loading of nips can be relieved individually, the web being calendered can be treated single-sidedly by loading, e.g., the top and bottom rolls of a reversing nip by unequal forces. Furthermore, existing calenders can be readily and cost-efficiently modernized into a calender according to the invention.

More specifically, the calender according to the invention is characterized by what is stated in the characterizing part of claim 1.

Furthermore, the calendering method according to the invention is characterized by what is stated in the characterizing part of claim 8.

In the following, the invention will be examined in more detail by making reference to the appended drawings.

FIG. 1 shows diagrammatically a calender according to the invention.

FIG. 2 shows diagrammatically another calender according to the invention.

Referring to FIG. 1, the calender construction shown

therein comprises a top roll 1 and a variable-crown bottom roll 2 having therebetween adapted intermediate rolls 3 of an intermediate roll set. The number of the intermediate rolls 3 is at least one. The rolls 1, 2, 3 are mounted on bearing blocks 4 that are further connected to mounts 5. The mounts 5 are slidably connected to guides 7 adapted on the calender frame 6. The roll set is moved and the load pressures of the nips formed between the rolls 1, 2, 3 is adjusted with the help of actuators such as loading cylinders 8 adapted to the calender frame 6 so as to impose the loading forces on the top roll 1 and the bottom roll 2. During calendering, the web passes the nips formed by the superimposed rolls.

Between the mounts 5 of the rolls forming the nip between two superimposed rolls, there are provided springs 9 such as a stack of cup springs, acting as actuators so as to relieve the linear loading of the nips caused by the weights of the rolls and the auxiliary devices connected thereto. Provided that a sufficient operating space is available, the springs 9 may alternatively be placed between the bearing blocks 4 of superimposed rolls forming a nip. If a complete elimination of the linear loading caused by the rolls and their auxiliary devices on the nips is desirable, the springs 9 must be dimensioned so that their spring constant and length or, alternatively, the number of cup springs in a single stack of cup springs is selected such that the spring system 9 adapted between each mount 5 and/or bearing block 4 can support the weight of its overlying rolls and their auxiliary devices. Then, the spring constants are selected such that the spring system located between the

mounts 5 of rolls 2, 3 forming the bottom nip has the highest spring constant, while the spring system located between the mounts 5 of rolls 1, 3 forming the top nip is selected to have the lowest spring constant. When the rolls 1, 2, 3 are not loaded by the loading cylinders 8, the springs 9 keep the rolls 1, 2, 3 separated at a distance of the quick-opening gap from each other. Additionally, the springs 9 must have some degree of overcompressibility to prevent them from bottoming during the loading of the roll set.

To keep the loading of the nips maximally equal, the springs 9 must be dimensioned so as to make all the nips to close simultaneously when loading is applied on the nips. Hence, the springs 9 of a smaller spring constant placed between the mounts 5 of the rolls forming the upper nips must respectively have a longer working travel. Alternatively, the system can be constructed using progressive springs in which the spring constant changes with the travel.

The quick-opening of the calender nips is accomplished by way of removing the loading imposed by the loading cylinders 8, whereby the springs 9 placed between the mounts 5 can separate the rolls 1, 2, 3 apart from each other. The gap width of the quick-opened nips can be changed by, e.g., varying the number of cup springs in the assembled spring stack.

In the embodiment of FIG. 2, there are no springs 9 located between the mounts 5 of the rolls forming a nip, but rather, hydraulic cylinders 19 are used as the actua-

tor means. Herein, the gap width of the quick-opened nips and the nip loading forces can be adjusted with the help of the hydraulic cylinders 19 by means of changing the pressure of the hydraulic fluid. Otherwise the embodiment of FIG. 2 is basically identical to that shown in FIG. 1. Also the hydraulic cylinders 19 may be located, within the space constraints, between the bearing blocks 4 of superimposed rolls 1, 2, 3 forming a nip. To save space, the cylinder portion of the hydraulic cylinder 19 and the hydraulic fluid channels communicating therewith may be machined directly into the interior of the mounts 5 or the bearing blocks 4.

In addition to those described above, the invention may have alternative embodiments.

When necessary, the loading of certain nips may be relieved by a greater amount than the loading of certain others, whereby it is possible within the constraints of the allowable deflections of rolls 1, 2, 3 to affect the degree of single-sidedness of the calendered web.

The top roll 1 and/or the bottom roll 2 may be connected by their bearing blocks 4 to the guides 7, rather than by their mounts as taught above. The top roll 1 or the bottom roll 2 of the calender can be solidly connected by its mounts 5 or bearing blocks 4 to the calender frame 6 or its guides 7. In this arrangement, the fixed rolls 1, 2 need not be provided with loading cylinders 8, but rather, the entire roll set of the stack can be simply loaded with the help of the loading cylinders 8 acting on the other roll 1, 2 adapted movable along the guides 7.

What is claimed is:

1. Calender for calendering a web of paper or board, the calender comprising

- a top roll (1) and a bottom roll (2), both of the rolls being of the variable-crown type,

- at least one intermediate roll (3) of an intermediate roll stack adapted between said top roll (1) and said bottom roll (2) in a disposition allowing the superimposed rolls (1, 2, 3) of the stack to be brought into a nip contact with each other during calendering, and

- bearing blocks (4) in which said rolls (1, 2, 3) are mounted, and

- mounts (5) to which the bearing blocks (4) of the intermediate roll (3) are connected and which are slidably connected to the guides (7) adapted to the calender frame (6),

c h a r a c t e r i z e d by actuator means (9, 19) adapted between the mounts (5) of said superimposed rolls (1, 2, 3) forming said nips and/or between the bearing blocks (4) of said rolls so as to accomplish the relief of nip loading imposed by the weight of said intermediate rolls (3) and the auxiliary means connected thereto.

2. Calender according to claim 1, c h a r a c t e r - i z e d in that said actuator means is a spring (9).

3. Calender according to claim 1 or 2, c h a r a c - t e r i z e d in that said actuator means is a hydraulic cylinder (19).

4. Calender according to any one of foregoing claims 1-3, c h a r a c t e r i z e d in that said actuator means are adapted to function between the mounts (5) of said superimposed rolls (1, 2, 3) forming said nips.

5. Calender according to any one of foregoing claims 1-4, c h a r a c t e r i z e d in that said actuator means are adapted to function between the bearing blocks (4) of said superimposed rolls (1, 2, 3) forming said nips.

6. Calender according to claim 3, c h a r a c t e r - i z e d in that said mount (5) includes the cylinder portion of said hydraulic cylinder (19) with the hydraulic channels thereof.

7. Calender according to claim 3 or 6, c h a r a c - t e r i z e d in that said bearing block (4) includes the cylinder portion of said hydraulic cylinder (19) with the hydraulic channels thereof.

8. Method for calendering a web of paper or board, the method comprising the steps of

- passing the web to be calendered via nips formed by a variable-crown top roll (1) and a variable-crown bottom roll (2), as well as at least one intermediate roll (3) of an intermediate roll set placed between said rolls, said rolls (1, 2, 3) being mounted in a bearing blocks (4) and the bearing blocks (4) of the

intermediate roll (3) being slidably connected to the calender frame (6),

c h a r a c t e r i z e d in that

- the nip loading imposed by the weight of said intermediate rolls (3) and the auxiliary means connected thereto is relieved by actuator means (9, 19) adapted between the mounts (5) of said superimposed rolls (1, 2, 3) forming said nips and/or between the bearing blocks (4) of said rolls.

9. Method according to claim 8, c h a r a c t e r - i z e d in that said actuator means (9, 19) serve to accomplish an at least essentially complete relief of the nip loading imposed by the weight of said intermediate rolls (3) and auxiliary devices connected thereto.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
5 April 2001 (05.04.2001)

PCT

(10) International Publication Number
WO 01/23667 A1

(51) International Patent Classification[7]: D21G 1/00

(21) International Application Number: PCT/FI00/00809

(22) International Filing Date:
21 September 2000 (21.09.2000)

(25) Filing Language: Finnish

(26) Publication Language: English

(30) Priority Data:
19992057 24 September 1999 (24.09.1999) FI

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(81) Designated States *(national)*: AE, AG, AL, AM, AT, AT (utility model), AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, CZ (utility model), DE, DE (utility model), DK, DK (utility model), DM, DZ, EE, EE (utility model), ES, FI, FI (utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (utility model), SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

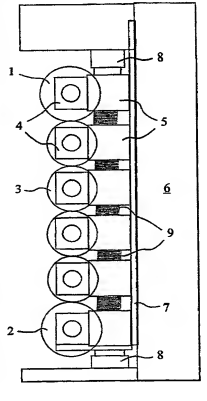
(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *With international search report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: CALENDER

(57) Abstract: The present invention relates to a calender for calendering a moving web of paper or board, the calender comprising a top roll (1) and a bottom roll (2), both of the rolls being of the variable-crown type, at least one intermediate roll (3) of an intermediate roll stack adapted between the top roll (1) and the bottom roll (2) in a disposition allowing the superimposed rolls (1, 2, 3) of the stack to be brought into a nip contact with each other during calendering, and support means (4, 5) for mounting the rolls (1, 2, 3) to the frame (6) of the calender or, alternatively, to guides (7) mounted on the frame (6). Actuator means (9, 19) are adapted between the mounts (5) of the superimposed rolls (1, 2, 3) forming the nips and/or between the bearing blocks (4) of the rolls so as to accomplish the relief of nip loading imposed by the weight of the intermediate rolls (3) and the auxiliary means connected thereto.



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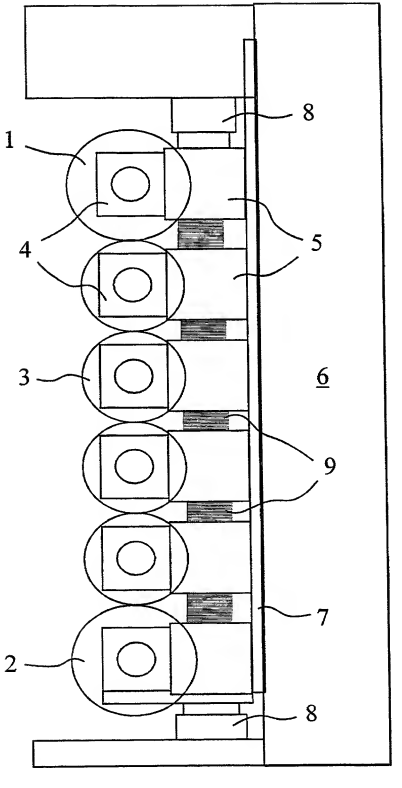

Fig. 1

10/088459
PCT/FI00/00809

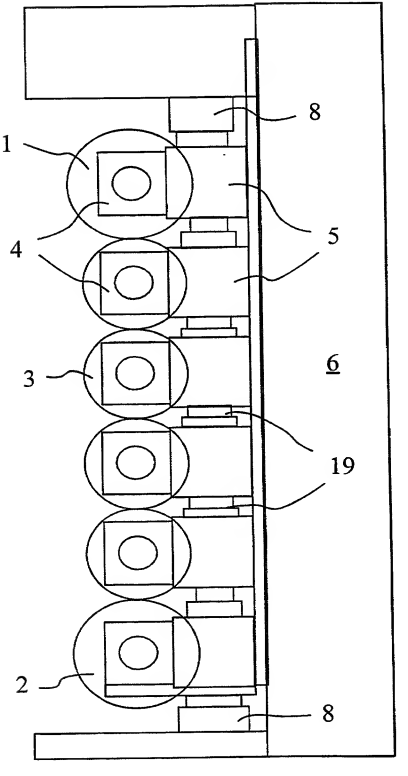

Fig. 2

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY Includes Reference to PCT International Applications	Attorney's Docket No.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

the specification of which (check only one item below)

[] is attached hereto

[] was filed as United States application

Serial No. _____

on _____

and was amended

on _____ (if applicable).

[X] was filed as PCT international application

Number PCT/FI00/00809

on September 21, 2000

and was amended under PCT Article 19

on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the patentability of the application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

PRIOR FOREIGN/PCT APPLICATIONS AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. 119:

Country (if PCT, indicate "PCT")	Application Number	Date of Filing (day, month, year)	Priority Claimed Under 35 U.S.C. 119	
Finland	19992057	Sept. 24, 1999	[X] YES	[ ] NO
PCT	PCT/FI00/00809	Sept. 21, 2000	[X] YES	[ ] NO
			[ ] YES	[ ] NO
			[ ] YES	[ ] NO
			[ ] YES	[ ] NO

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY (Continued)
Includes Reference to PCT International Applications

Attorney's Docket No.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application:

PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT UNDER 35 U.S.C. 120:

U.S. APPLICATIONS		STATUS *(check one)*		
U.S. APPLICATION NUMBER	U.S. FILING DATE	PATENTED	PENDING	ABANDONED

PCT APPLICATIONS DESIGNATING THE U.S.					
PCT APPLICATION NO.	PCT FILING DATE	U.S. SERIAL NUMBERS ASSIGNED *(if any)*			
PCT/FI00/00809	Sept. 21, 2000				

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith (*List name and registration number*)

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Combined Declaration for Patent Application and Power of Attorney (Continued) (Includes Reference to PCT International Applications)				Attorney's Docket No.
203	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME
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	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY
204	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME
	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP
	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY
205	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME
	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP
	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY
206	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME
	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP
	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY
207	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME
	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP
	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY
208	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME
	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP
	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY
209	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME
	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP
	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY

Combined Declaration for Patent Application and Power of Attorney (Continued) (Includes Reference to PCT International Applications)				Attorney's Docket No.
210	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME
	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP
	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY
211	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME
	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP
	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY
212	FULL NAME OF INVENTOR	FAMILY NAME	FIRST GIVEN NAME	SECOND GIVEN NAME
	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP
	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE & ZIP CODE/COUNTRY

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under §1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

SIGNATURE OF INVENTOR 201	SIGNATURE OF INVENTOR 202	SIGNATURE OF INVENTOR 203
DATE 15.02.2002 Feb. 15, 2002	DATE	DATE
SIGNATURE OF INVENTOR 204	SIGNATURE OF INVENTOR 205	SIGNATURE OF INVENTOR 206
DATE	DATE	DATE
SIGNATURE OF INVENTOR 207	SIGNATURE OF INVENTOR 208	SIGNATURE OF INVENTOR 209
DATE	DATE	DATE
SIGNATURE OF INVENTOR 210	SIGNATURE OF INVENTOR 211	SIGNATURE OF INVENTOR 212
DATE	DATE	DATE